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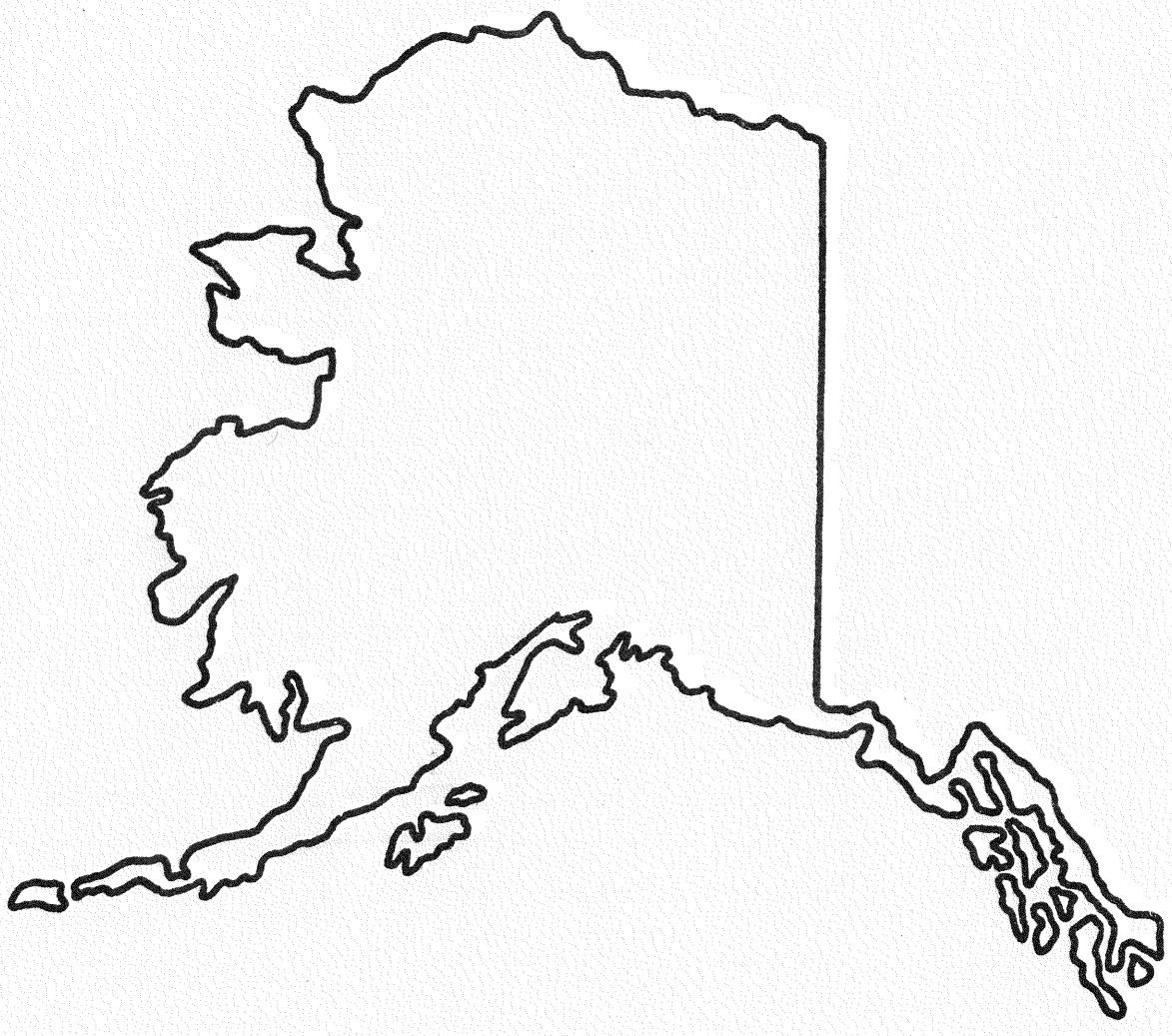
Alaska
Region

Forest Pest Management Report

R10-90-7

Investigation of Spruce Beetle and Spruce Budworm Activity Near Haines, Alaska

February 1991



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BIOLOGICAL EVALUATION R10-90-7

Investigation of Spruce Beetle and Spruce Budworm
Activity Near Haines, Alaska

February 1991

Prepared By:

Roy A. Mask, Entomologist
Forest Pest Management
Region 10, Alaska

Approved By:

Eugene D. Lessard, Group Leader
Forest Pest Management
State and Private Forestry
Region 10, Alaska

Paul W. Forward, Director
State and Private Forestry
Region 10, Alaska

Forest Pest Management
State and Private Forestry
Alaska Region
USDA Forest Service
201 E. Ninth Ave., Suite 201
Anchorage, Alaska 99501

INTRODUCTION

Each year, Forest Pest Management (USDA Forest Service) personnel conduct aerial surveys to detect insect and disease activity on forested lands throughout Alaska. The 1990 survey of lands near Haines, Alaska revealed spruce beetle (Dendroctonus rufipennis Kirby) activity, not noted in previous years' surveys (see Figure 1). Also noted within the same area was Sitka spruce defoliation caused by spruce budworm (Choristoneura sp.) (See Figure 1). Approximately 3700 acres of beetle activity was noted in the Haines and Skagway areas. Sitka spruce defoliation by the spruce budworm in the same area was estimated at 11,500 acres. Spruce budworm defoliation has been noted periodically in the area since 1948 (McCambridge 1954). An on-site investigation of insect activity on state land was made in October, 1990 at the request of the Alaska Department of Natural Resources, Division of Forestry.

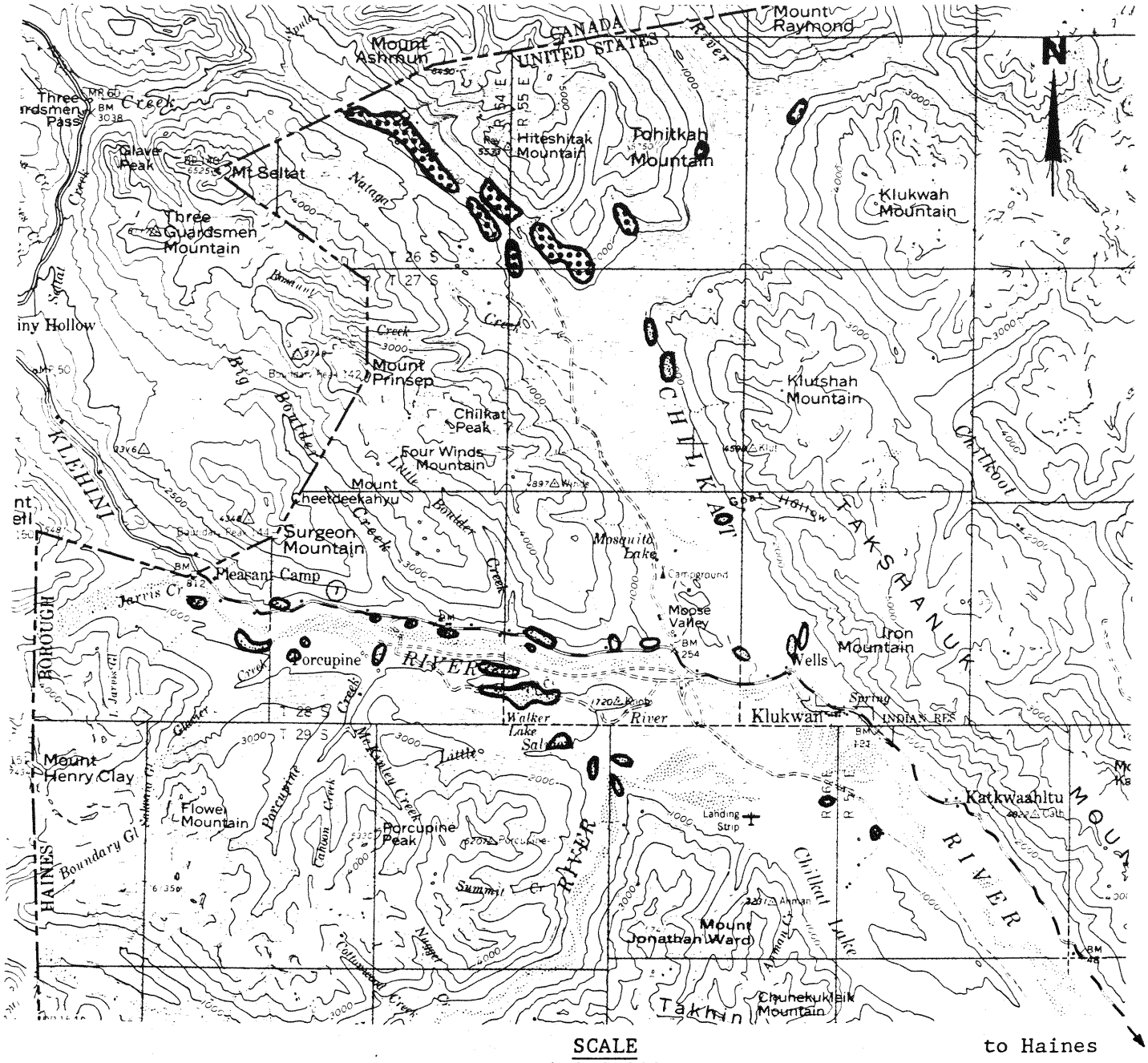
Spruce Beetle

The spruce beetle is the most destructive forest insect in Alaska. Spruce beetle infestations are most common in south-central and interior Alaska within Lutz and white spruce stands (Holsten 1990a). Weather conditions in these regions appear to favor beetle population expansion (Holsten 1990b). Spruce beetle outbreaks in Sitka spruce in southeast Alaska have been uncommon (Eglitis 1984). However, significant outbreaks in southeast Alaska include a five year infestation on Kosciusko Island in the 1940's (Hard 1974); an infestation in 1956 on Dall Island; scattered mortality in Yakutat Forelands and the Taku River drainage in the early 1980's; and current spruce beetle activity in Glacier Bay National Park (over 24,000 acres as of FPM's 1990 survey).

Spruce Budworm

The Choristoneura complex is composed of several species. Early accounts of budworm activity in Alaska identified C. fumiferana, which was later believed to be C. orae. In 1978, spruce defoliation by species of the Choristoneura complex occurred in Anchorage, near Hope, and near Fairbanks (Holsten 1980). Adults were reared from larvae collected at these outbreaks and were identified as forms resembling one of the following: C. occidentalis, C. biennis or C. orae; as well as a species not resembling these three.

Adult moths were not present during this fall field investigation, therefore, no attempt was made to distinguish between Choristoneura species. Defoliation has however been severe enough in consecutive years to rule out the two-year budworm, C. biennis.



SCALE
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LEGEND

Defoliation By Spruce Budworm - 1990 Aerial Survey

Spruce Beetle Activity - 1990 Aerial Survey

Figure 1. Location of Spruce Budworm and Spruce Beetle activity near Haines, AK, 1990.

OBSERVATIONS

Spruce beetle activity was noted at several locations within the Klehini Opener and Buena Vista timber sale areas. Several cutting units (clearcuts) were visited and observations were made concerning slash clean-up, presence of log decks and beetle occurrence in adjacent standing timber.

Sitka spruce defoliation was investigated within the Kelsall River drainage (see Figure 1). Sites were visited at random within the infested area to verify the defoliator and to visually assess overall impact.

DISCUSSION

Investigation of spruce beetle activity within the Buena Vista sale area revealed the presence of right-of-way logs and standing timber infested in 1989 and 1990. The Klehini Opener sale area had several log decks attacked by spruce and Ips beetles in 1990 and had several areas of scattered blowdown without beetles. New spruce beetle attacks in adjacent standing timber were noted in association with one deck. The primary causal factors appeared to be scattered windthrown spruce (which become brood trees) and cull spruce logs left in old decks. All other slash clean-up across the cutting units appeared thorough and timely. The current timber harvesting (clearcutting) alone did not cause the noted beetle activity.

Spruce budworm activity in the Kelsall River drainage was investigated within the Kelsall Express timber sale area. The infestation has been bordering epidemic levels for as many as three years but appears to be declining. Defoliation will, however, continue to be visible in the next two or three years. Top-kill is present across the infested area and is evidence of multi-year infestations.

RECOMMENDATIONS

Spruce Beetle

Spruce beetle was found at endemic levels at various locations within the Klehini Opener and Buena Vista timber sale areas. An active salvage program with slash clean-up equal to that of the original sales, will likely keep beetle populations in check. All large spruce logs (>12" diameter) remaining in decks and accessible windthrown trees should be removed as part of the salvage program. A second option is to burn logs instead of salvage. Logs and trees infested in 1989 should be removed or burned prior to May 1991. Logs and trees infested in 1990, should be removed or burned prior to May 1992.

Spruce Budworm

Moderate to heavy defoliation over a period of several years has resulted in probable growth loss and some top-kill of mature Sitka spruce within the Kelsall and adjacent river drainages. Defoliation is expected to decline naturally within the next three years. Budworm populations are typically cyclic and are greatly influenced by adverse weather conditions. Timber harvest is an option to prevent further decline in areas of heaviest top-kill. Any spruce regeneration that develops within harvested areas will likewise be subject to periodic defoliation as budworm populations fluctuate. The outbreak does not appear to be of sufficient size or duration to justify expense of large-scale suppression (aerial spraying of insecticide) efforts.

Further investigations are planned in 1991 to verify expected declines in insect activity.

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APPENDIX A

SPRUCE BEETLE
Dendroctonus rufipennis (Kirby)
(Coleoptera: Scolytidae)

HOSTS: White, Sitka, Lutz, and rarely black spruce.

DISTRIBUTION: Wherever spruce is found; a serious forest pest in southcental Alaska throughout Cook Inlet and Kenai Peninsula.

DAMAGE: Larvae feed beneath bark, usually killing affected trees.

DESCRIPTION: Adult spruce beetles are maroon to black, cylindrical in shape, approximately 5 mm long and 3 mm wide. Larvae are stout, white, legless grubs, 6 mm long when full grown. The pupae are soft-bodied, white, and have some adult features.

BIOLOGY: The life cycle of the spruce beetle may vary from one to three years, with a two-year cycle being the most common. Temperature plays an important part in determining the length of time required for beetle development.

Adult beetles become active in the spring (late May to early June) when air temperatures reach a threshold of 16 degrees C (61 degrees F). At this time, beetles emerge from trees in which they overwintered and fly in search of new host material. These dispersal flights may be short-range even though beetles are capable of flying for several miles without stopping.

Spruce beetles prefer to attack the sides and bottom surfaces of windthrown or other down materials which have been on the ground less than one year. In the absence of such host material, large diameter live trees may be attacked instead and if beetle populations are high, these trees may be killed.

Beetle attacks, whether on windthrown or on standing timber, are mediated by pheromones which insure that individual trees will be attacked "en masse", and fully colonized by subsequent broods. Trees that are mass-attacked form attractive centers which result in groups of trees being killed by spillover attacks.

Female beetles initiate attacks and begin constructing an egg gallery in the cambium parallel to the grain of the tree. They are joined by males and after mating, lay eggs in small niches along the sides of the egg gallery. Most eggs will hatch by August. As they feed in the cambium, larvae construct their own galleries perpendicular to the egg gallery. Normally, spruce beetles pass their first winter in the larval stage, resume feeding the next spring, and pupate by summer. About two weeks later, pupae transform into adults which pass the second winter, either in the old pupation site, or more commonly, in the bases of infested trees. The following spring, two years after initial attack, the new adults emerge and attack new host material. In some years when temperatures are abnormally high, or on certain warmer microsites, spruce beetles may complete their development within one season and new adults will emerge one year after attack.

Most major outbreaks of spruce beetle have originated from stand disturbances - blowdown, logging, or right-of-way clearance. Stand susceptibility to beetle attack is influenced by stocking, with slow growth and moisture stress playing an important part in predisposing trees to attack.

SPRUCE BUDWORM
Choristoneura sp.
(Lepidoptera: Tortricidae)

HOSTS: Sitka, Lutz and white spruce.

DISTRIBUTION: Throughout Alaska, as far north as Fairbanks.

DAMAGE: Larvae feed on buds, foliage, cones and seeds. Repeated defoliation causes growth-loss, top-kill and in prolonged infestations, death of the host.

DESCRIPTION: Adult moths are grey-brown to orange and have a wingspan of 22 to 28 mm. Female moths lay light green eggs in an overlapping configuration on the underside of host needles. Mature larvae are approximately 32 mm long, with a brown to black head and brown body with ivory-colored spots.

BIOLOGY: Spruce budworm larvae overwinter in silken shelters spun beneath bark scales and among old male flowers. Larvae bore through bud scales and begin feeding in May or June. As buds develop, larval feeding continues on newly expanding foliage, with occasional feeding on old needles.

Mature larvae make individual shelters out of live and cut needles in which they pupate (mid to late June). Pupae are reddish-brown to black and are approximately 10 mm long. Adults emerge in six to ten days. Female moths deposit eggs on host foliage. Larvae hatch in late summer and without feeding, seek overwintering shelter.